Name _____

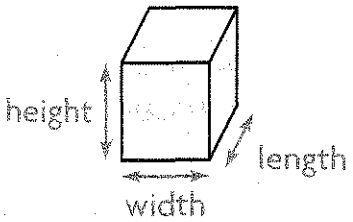
Identify Solid Shapes

Essential Question How can you identify, describe, and classify solid shapes?

G.8.3.1 Compare, contrast and build *three-dimensional* solids by investigating the number of *faces, edges,* and *vertices* on models

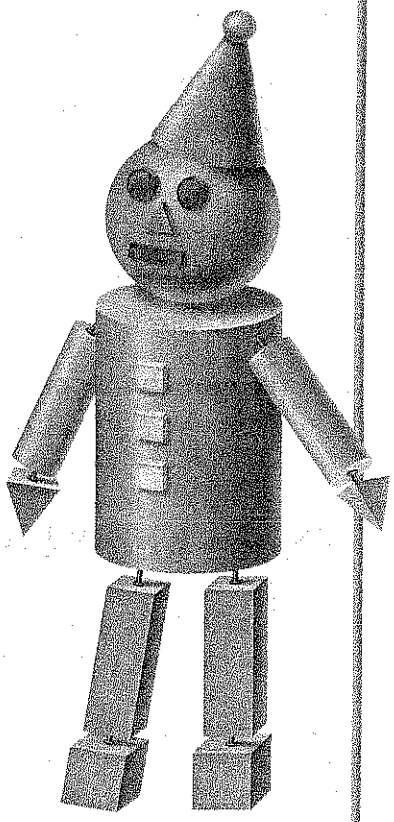
UNLOCK the Problem REAL WORLD

Solid shapes have length, width, and height. They are also called **three-dimensional shapes**.

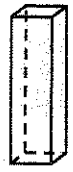


Find solid shapes.

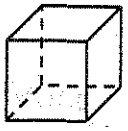
Carly has a wooden clown puppet. Which parts of the puppet are shaped like a square pyramid?



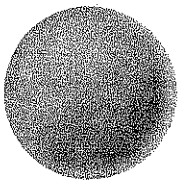
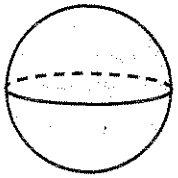
rectangular prism

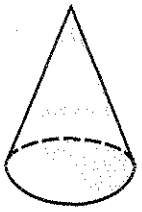
cube

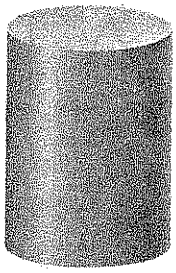
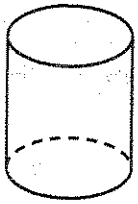
sphere

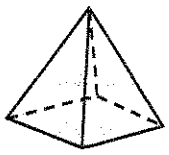
cone

cylinder

square pyramid

So, the _____ are shaped like a square pyramid.

Math Talk Give an example of an object in the classroom that has both curved and flat surfaces.

1. What part of the puppet is shaped like a cylinder?

_____

2. What part of the puppet is shaped like a rectangular prism? _____

Explore solid shapes.

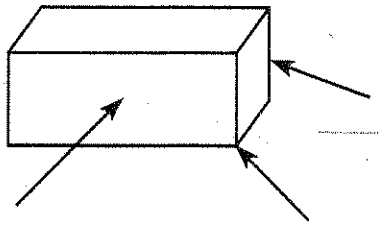
Solid shapes can be classified by the number of faces, edges, and vertices.

A polygon that is a flat surface of a solid shape is a **face**.

An **edge** is a line segment formed where two faces meet.

A **vertex** is a point where three or more edges meet. The plural of *vertex* is *vertices*.

Try This! Write the word to describe what the arrow is pointing to.



Activity Name the faces of a prism and pyramid.

Materials ■ cube, rectangular prism, square pyramid, paper, crayons

- Trace the faces of a cube. Name the plane shapes you drew.
- Count the number of faces, edges, and vertices. Record the numbers in the table.
- Repeat the steps for a rectangular prism and a square pyramid.

Name of Shape	Names of Faces	Number of		
		Faces	Edges	Vertices
cube				
rectangular prism				
square pyramid				

Share and Show MATH BOARD

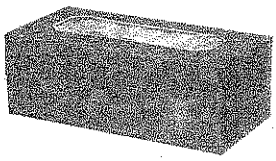
1. Name the solid shape that has the faces shown at the right.

_____

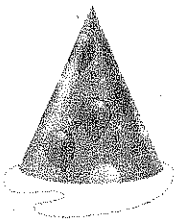
Name the solid shape that the object is shaped like.

2. 

_____

3. 

_____

4. 

_____

5. 

_____

Math Talk Explain why a cube has the same number of faces, edges, and vertices as a rectangular prism.

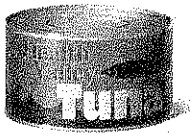
Name _____

On Your Own

Name the solid shape that the object is shaped like.

6. 

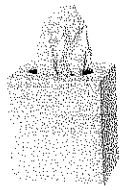
_____

7. 

_____

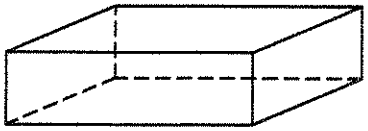
8. 

_____

9. 

_____

Name the solid shape. Then write the number of faces, edges, and vertices.

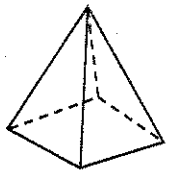
10. 

_____

_____ faces

_____ edges

_____ vertices

11. 

_____

_____ faces

_____ edges

_____ vertices

H.O.T. **Write *All*, *Some*, or *None* to complete the sentence.**

12. _____ of the faces of a cube are squares.

13. _____ of the faces of a square pyramid are triangles.

14. _____ of the faces of a rectangular prism are curved.

15. Write Math **What's the Question?** The answer is six square faces.

_____

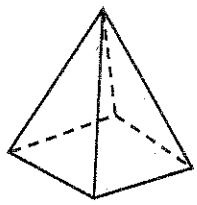
_____

16. H.O.T. A rectangular prism has at least _____ pairs of congruent faces.

17. ★ **Test Prep** Aaron drew the shape at the right. What solid shape did he draw?

Ⓐ rectangular prism Ⓒ cube

Ⓑ square pyramid Ⓓ cylinder

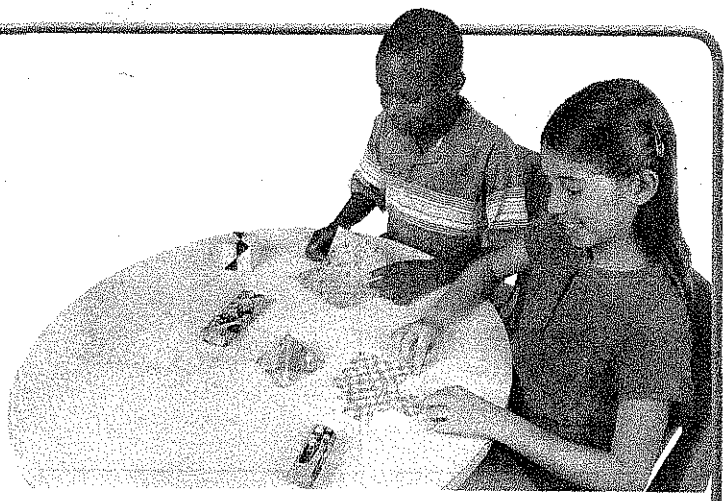


Connect to Reading

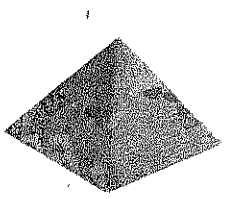
Classify and Categorize

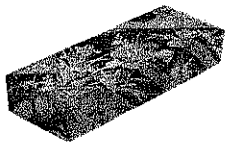
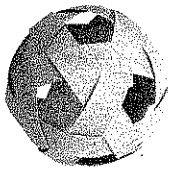
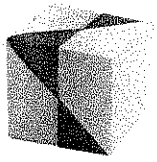
Origami is the Japanese art of folding paper. The only material you need is paper. You can make models of animals, flowers, and geometric shapes.

When you classify three-dimensional shapes, you organize them into groups by ways they are alike.



▲ The name origami comes from the Japanese word "oru," which means to fold, and "kami," which means paper.



Shapes with Flat Surfaces	Shapes with Curved Surfaces	Shapes That Stack	Shapes That Roll	Shapes That Have Faces
rectangular prism	sphere	cube	cylinder	cube
cube	cylinder	rectangular prism	sphere	rectangular prism
square pyramid	cone	cylinder	cone	square pyramid
cylinder				
cone				

Use *classify and categorize* to solve.

18. How are a rectangular prism and a cylinder alike and different?

_____

_____

_____

19. Explain the difference between the face of a cube and the flat surface of a cylinder.

_____

_____

_____

Name _____

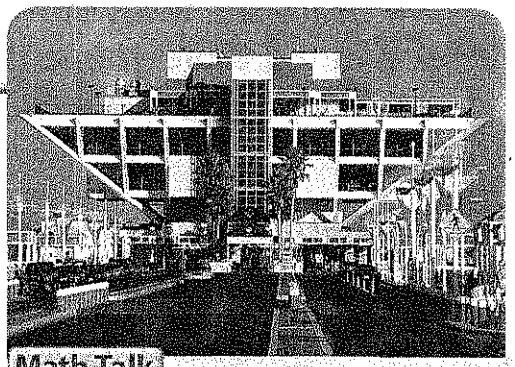
Identify Geometric Shapes

Essential Question How can you determine which shapes make up three-dimensional figures?

G.11.3.2 Determine which new figure will be formed by combining and subdividing models of existing figures

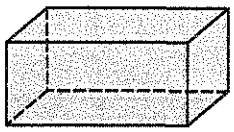
UNLOCK the Problem REAL WORLD

Describe Three-Dimensional Shapes You can name the faces of a three-dimensional shape to describe the shapes that will be created if you take the figure apart.

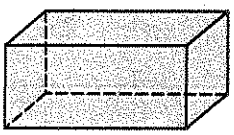


Math Talk Identify the two-dimensional and three-dimensional shapes you see in the photograph of the St. Petersburg Pier.

Activity 1 Identify faces of prisms and pyramids.

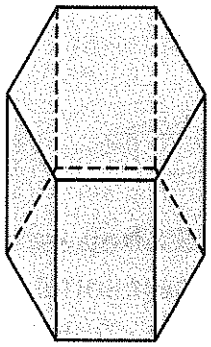


- Look at the faces of the shape in the table. Name the two-dimensional shapes. Count the faces.
- Record the names, shapes, and numbers in the table.
- Use the second column to choose a shape and record its information.

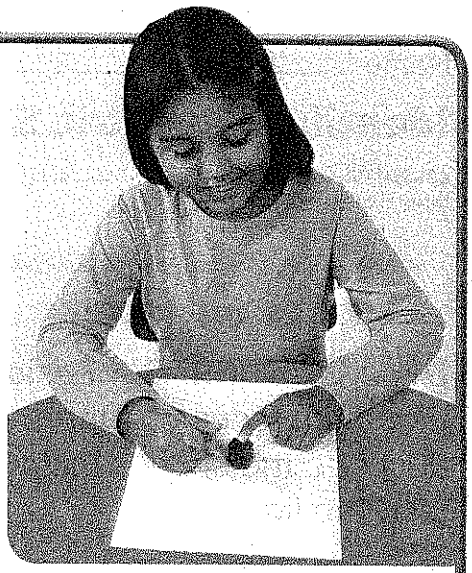
Name of Shape	rectangular pyramid	
Shape of Faces		
Names of Faces and Number of Each Kind	_____ triangles _____ rectangle	
Total Number of Faces	5	

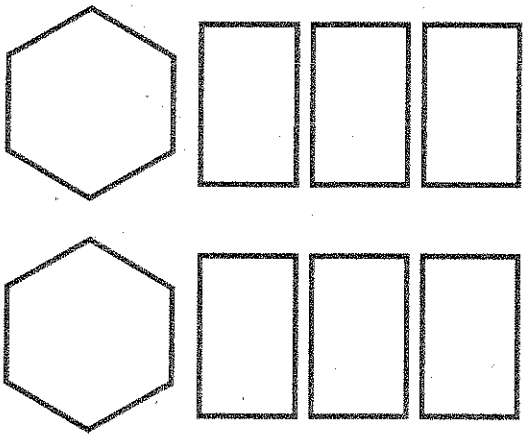
Activity 2 Trace faces of pyramids and prisms.

Materials ■ three-dimensional shapes



- Trace the faces of the shape in the table. Name the two-dimensional shapes. Count the faces.
- Record the names, shapes, and numbers in the table.
- Use the second column to choose a shape and record its information.



Name of Shape	hexagonal prism	
Shape of Faces		
Names of Faces and Number of Each Kind	_____ hexagons _____ rectangles	
Total Number of Faces	8	

Name _____

Share and Show MATH BOARD

Identify a three-dimensional shape that is described.

1. 6 squares

2. 2 triangles
   3 rectangles

3. 2 circles
   1 rectangle

4. 4 triangles

On Your Own

Identify a three-dimensional shape that is described.

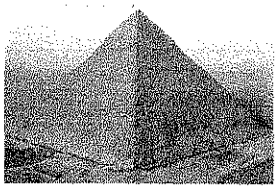
5. 1 square
   4 triangles

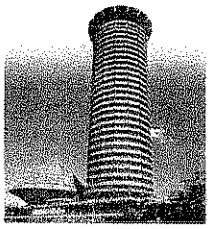
6. 2 hexagons
   6 rectangles

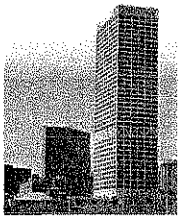
7. 4 triangles

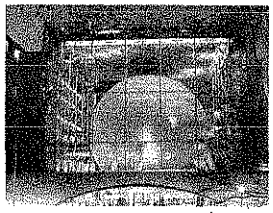
8. 1 pentagon
   5 triangles

Identify the three-dimensional shape or shapes you see that describe the objects.

9. 

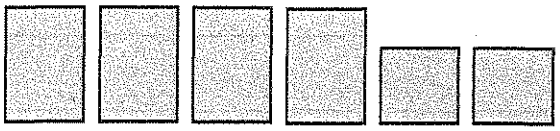
10. 

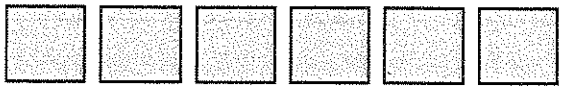
11. 

12. 

Identify the three-dimensional shape that has the faces shown.

13. 

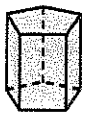
14. 

15. 

16. 

Math Talk Explain how cubes and rectangular prisms are alike and how they are different.

Identify the three-dimensional shape. Draw the faces.

17.  _____

18.  _____

Problem Solving

19. Describe how circles and spheres are alike and how they are different.

_____

_____

_____

_____

_____

_____

20. Describe how squares and cubes are alike and how they are different.

_____

_____

_____

_____

_____

_____

21. HOT Are all rectangular pyramids square pyramids? Explain.

_____

_____

_____

_____

_____

22. HOT **What's the Question?** The answer is 2 triangular faces and 3 rectangular faces.

_____

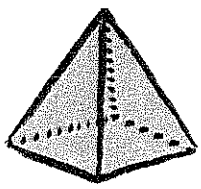
_____

_____

_____

_____

23. ★ **Test Prep** What three-dimensional shape did Josh draw?



Ⓐ square

Ⓑ square pyramid

Ⓒ triangular prism

Ⓓ triangular pyramid

Name _____

Three-Dimensional Model

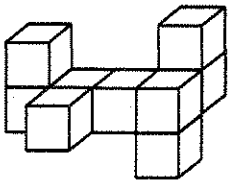
Essential Question How can you make irregular solids?

G.11.3.1 Replicate a *three-dimensional* model composed of *cubes* when given a physical model.

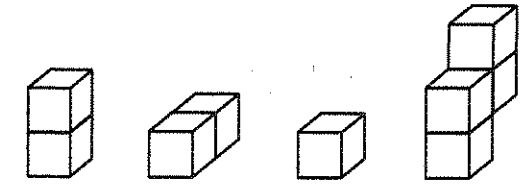
Investigate

Materials ■ connecting cubes

Martin made the connecting cube solid shown on the right. Use connecting cubes to create a shape identical to Martin's.



A. Divide the shape into sections. Count the number of cubes in each section.



Section 1 has _____ cubes.

Section 2 has _____ cubes.

Section 3 has _____ cubes.

Section 4 has _____ cubes.

There are _____ + _____ + _____

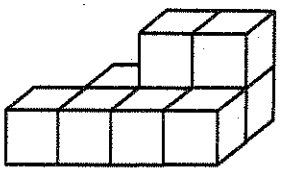
+ _____ = _____ cubes in Martin's solid.

B. Make each section using the same number of connecting cubes.

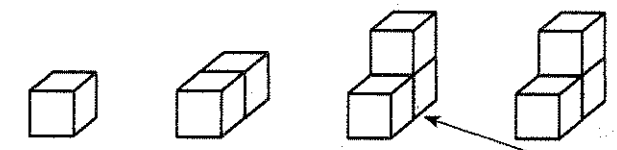
C. Put your 4 sections together, and compare your shape with the shape Martin made.

Try Another Problem

Create the model shown at the right.



A. Divide the shape into sections. Count the number of cubes in each section.



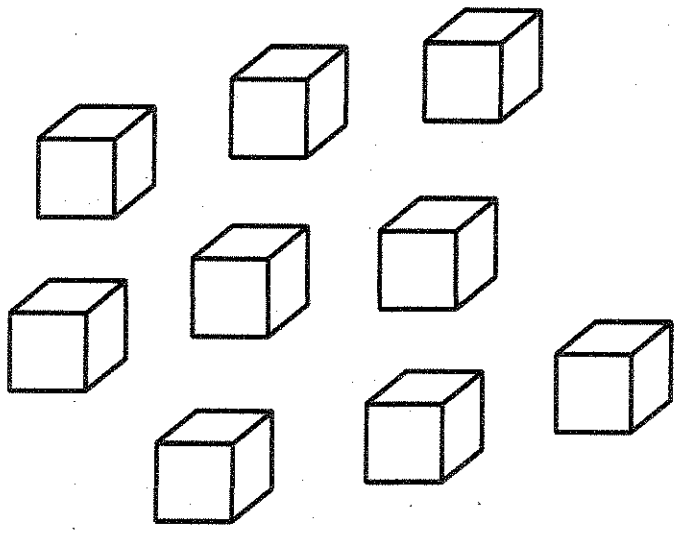
Section 1 Section 2 Section 3 Section 4

Sometimes there are cubes you cannot see. Those cubes should be counted as well.

B. Build a solid with connecting cubes that matches the model above.

Connect

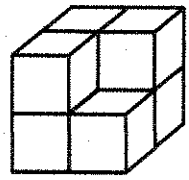
Use the exact number of cubes shown below to make a solid figure. Then trade shapes with a classmate and try to create exact models of each other's shapes.



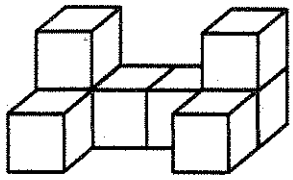
Name _____

Share and Show MATH BOARD

Use connecting cubes to build each figure.
Write the number of cubes you used.

1. 

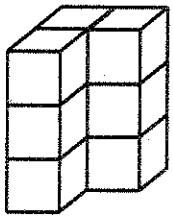
_____ cubes

2. 

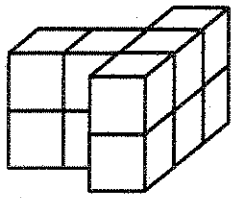
_____ cubes

On Your Own

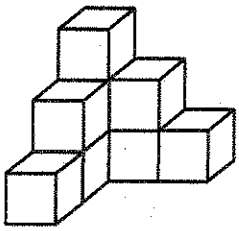
Use connecting cubes to build each figure.
Write the number of cubes you used.

3. 

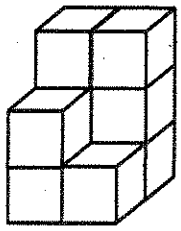
_____ cubes

4. 

_____ cubes

5. 

_____ cubes

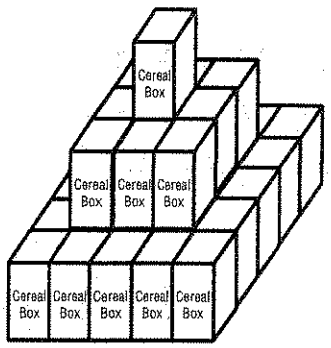
6. 

_____ cubes

Problem Solving REAL WORLD

Use the figure at the right for 7–8.

Edward created the display of cereal boxes shown.



7. H.O.T. How many cereal boxes are in the display?

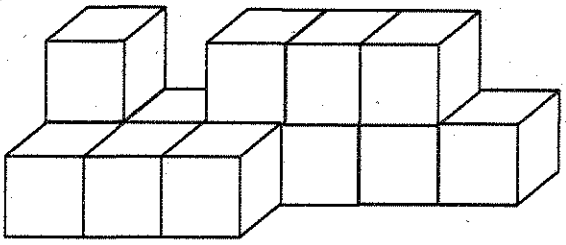
   Count the cereal boxes in each layer.

   - The bottom layer has 5 rows of 5 boxes. There are _____ in that layer.
   - The middle layer has 3 rows of 3 boxes. There are _____ in that layer.
   - The top layer has _____ box.
   - The total number of boxes is _____ boxes.

8. Build a similar solid with connecting cubes, and then count how many cubes you used.

   You would need _____ connecting cubes.

9. ★ Test Prep How many cubes are in the solid shown below?



Ⓐ 10 cubes

Ⓑ 11 cubes

Ⓒ 12 cubes

Ⓓ 13 cubes

SHOW YOUR WORK

Name _____

Volume

Essential Question What units do you use to measure capacity or volume?

M.13.3.12 Develop *strategies* for finding the *volume* (cubic units) of *rectangular prisms* and *cubes* using models

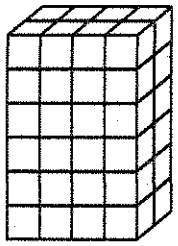
Volume is a measure of the amount of space taken up by a three-dimensional solid. Volume is expressed in **cubic units**. The volume of a rectangular prism can be shown by stacking columns and rows of unit cubes to represent the length, width, and height.

UNLOCK the Problem REAL WORLD

Find the volume of the rectangular prism in cubic units.

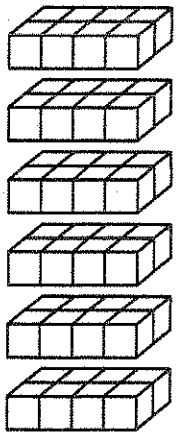
One Way Find the total number of cubes.

Jessie filled a juice box with the centimeter cubes arranged as shown. What is the volume of the juice box?



Math Idea

Cubic units are named for cubes that have sides that each measure 1 unit.



How many layers are in the solid? _____

How many cubes long is each layer? _____

How many cubes wide is each layer? _____

How many centimeter cubes are in each layer?

_____ × _____ = _____

How many centimeter cubes are in the solid?

_____ × _____ = _____

The total volume of the prism is _____ cubic centimeters.

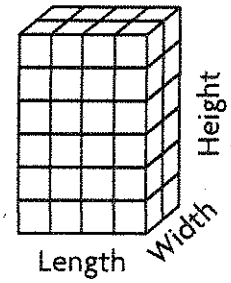
Another Way Use the length, width, and height.

The solid is _____ units long.

The solid is _____ units wide.

The solid is _____ units high.

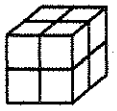
Length = number of rows
Width = number of columns
Height = number of layers



The volume of the solid is _____ × _____ × _____ = _____ cubic centimeters.

A cube is a special type of rectangular prism in which all edges have the same measure. All the faces are squares.

Example **Find the volume of the cube.**



Raven created the cube shown with building blocks. What is the volume of the cube?

There are _____ layers of cubes that are each _____ cubes long and _____ cubes wide. The solid has a total volume of

_____ × _____ × _____ = _____ cubic units.

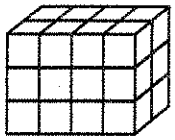
Math Talk How is this cube like and unlike a unit cube?

Share and Show

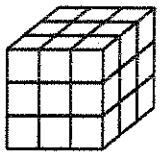
MATH BOARD

For each of the solids below, identify the length, width, and height. Then calculate the volume.

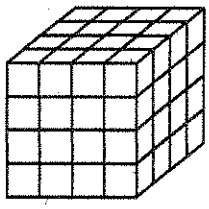
1. Length: _____
   Width: _____
   Height: _____
   Volume: _____



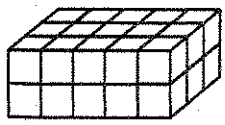
2. Length: _____
   Width: _____
   Height: _____
   Volume: _____



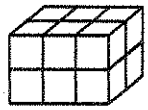
3. Length: _____
   Width: _____
   Height: _____
   Volume: _____



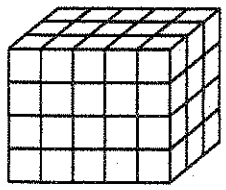
4. Length: _____
   Width: _____
   Height: _____
   Volume: _____



5. Length: _____
   Width: _____
   Height: _____
   Volume: _____



6. Length: _____
   Width: _____
   Height: _____
   Volume: _____

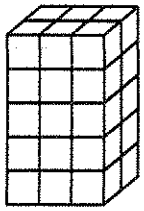


Name _____

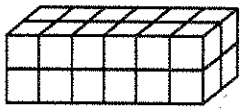
On Your Own

For each of the solids below, identify the length, width, and height. Then calculate the volume.

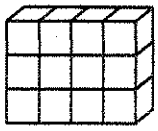
7. Length: _____
   Width: _____
   Height: _____
   Volume: _____



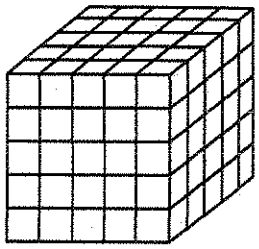
8. Length: _____
   Width: _____
   Height: _____
   Volume: _____



9. Length: _____
   Width: _____
   Height: _____
   Volume: _____

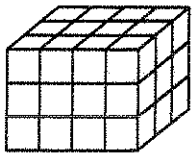


10. Length: _____
    Width: _____
    Height: _____
    Volume: _____



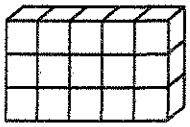
Use cubes to make each solid. Then write the volume in cubic units.

11.



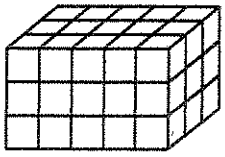
_____

12.



_____

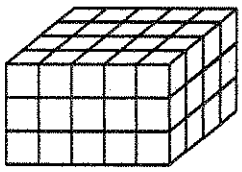
13.



_____

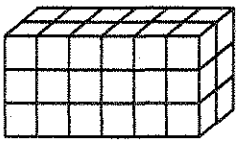
Write the volume in cubic units.

14.



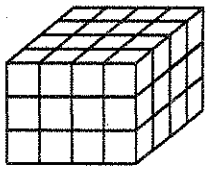
_____

15.



_____

16.



_____

Problem Solving REAL WORLD

Anthony sells boxes at his storage and shipping store. The dimensions of each box are given below. Calculate the volume of each box.

17. 3 feet by 2 feet by 2 feet

_____

18. 2 feet by 1 foot by 1 foot

_____

19. 4 feet by 4 feet by 4 feet

_____

20. 5 feet by 3 feet by 3 feet

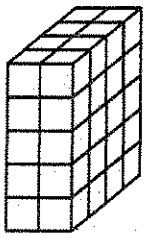
_____

21. HOT A small box measures 1 foot by 12 inches by 24 inches. What is its volume in cubic feet?

_____

SHOW YOUR WORK

22. ★ **Test Prep** What is the volume of the rectangular solid below?



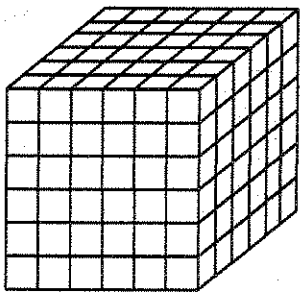
Ⓐ 8 cubic units

Ⓑ 11 cubic units

Ⓒ 20 cubic units

Ⓓ 40 cubic units

23. ★ **Test Prep** What is the volume of the cube below?



Ⓐ 18 cubic units

Ⓑ 42 cubic units

Ⓒ 66 cubic units

Ⓓ 216 cubic units